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EXAMINER

MOUTTET, BLAISE L

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 07/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/942,764

Applicant(s)

HOSONO ET AL.

Examiner

Blaise L Mouttet

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Specification

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

2. Claim 6 is objected to because "the designed criteria" should read --a designed criteria-- since this limitation was not previously claimed.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 3, 5, 20-22 and 24-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3 and 5 recite the limitation "the time interval" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. The applicant is advised to specify whether this time interval refers to the time period between the termination end

of the excitation element and the initial end of the ejection element or the natural period of ink pressure fluctuation.

In claim 20, line 2 "a second drive pulse" is claimed however no first drive pulse was previously claimed. This introduces doubt as to whether the scope of the claim includes two drive pulses or is limited to only a single drive pulse.

In claim 21, line 2 "a third drive pulse" is claimed however no first or second drive pulse was previously claimed. This introduces doubt as to whether the scope of the claim includes three drive pulses or is limited to only a single drive pulse.

In claim 22, line 3 "a second connecting element" is claimed however no first connecting element was previously claimed. This introduces doubt as to whether the scope of the claim includes two connecting elements or is limited to only a single connecting element.

In claim 24, line 2 and claim 25, line 2 "a fourth drive pulse" is claimed however no first, second or third drive pulse was previously claimed. This introduces doubt as to whether the scope of the claim includes four drive pulses or is limited to only a single drive pulse.

In claim 26, line 2 "a fifth drive pulse" is claimed however no first, second, third or fourth drive pulse was previously claimed. This introduces doubt as to whether the scope of the claim includes five drive pulses or is limited to only a single drive pulse.

In claim 27, line 2 and claim 28, line 2 "a sixth pulse" is claimed however no first, second, third, fourth or fifth pulse was previously claimed. This introduces doubt as to

whether the scope of the claim includes six drive pulses or is limited to only a single drive pulse.

In claim 27, line 3 and claim 28, line 3 "a second expansion element" is claimed however no first expansion element was previously claimed. This introduces doubt as to whether the scope of the claim includes two expansion elements or is limited to only a single expansion element.

In claim 27, line 3 and claim 28, line 3 "a second ejection element" is claimed however no first ejection element was previously claimed. This introduces doubt as to whether the scope of the claim includes two ejection elements or is limited to only a single ejection element.

The applicant may overcome the above rejections by appropriately amending the dependency of the claims or by deleting the numerical indicators for the cited limitations (i.e. --a pulse-- instead of "a sixth pulse"). For purposes of examination under 35 USC 102 and 35 USC 103 it will be assumed that only a single drive pulse is being claimed in each of the respective claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 8, 13-31, 33, 35 and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Teramae et al. EP 1 023 997.

Teramae et al. discloses, regarding claim 1, a method of manufacturing an ink jet recording head including a plurality of nozzle orifices forming at least one row, pressure chambers (i.e. ink channels) communicating with the orifices and pressure generating elements (i.e. piezoelectric elements) provided to eject ink, the method comprising the steps of:

assembling the ink jet recording head (column 7, lines 50-59);

measuring natural periods (T_a , T_c) of the ink pressure fluctuation in the pressure chamber of the assembled recording head (column 14, line 58 -column 15, line 15); and

classifying the assembled recording head into a plurality of ranks based on the measured natural period (column 16, lines 16-24).

identifying the natural period based on a correlation between the time period and the measured amount of ink (column 7, lines 47-62).

Regarding claims 3 and 5, time interval (t_4) is determined to have a nominal pulse width or a greater pulse width or lower pulse width dependent upon the ink ejection amount (column 6, lines 60-67).

Regarding claims 8 and 30, a plurality of ranks are assigned in accordance with the measured natural period (T_c) relative to a design criteria (see figures 9A and 9B).

Regarding claims 13 and 31, an electronic memory 12 stores the rank (column 6, lines 19-20).

Regarding claim 14, the drive signal is supplied to the pressure generating element for ejecting ink by the drive signal generating section (column 6, lines 17-25).

Regarding claims 15, 16 and 18, as shown in figure 8 the drive signal is provided with an ejection element (18) for ejecting ink, a damping element (20) which follows the ejection element to damp vibration of a meniscus and the time period of the damping element is altered to change ejection characteristics (column 16, lines 6-13).

Regarding claims 17 and 35, the ink jet recording head is shown in figure 3 and a waveform controller 9 which provides the waveform defined in accordance with the classified rank is shown in figure 1B.

Regarding claims 19, the drive signal (figure 8) includes an expansion element (16), ejection element (18), a holding element (17) and a damping element (20) wherein the waveform controller defines the duration of the holding element (column 12, lines 20-53).

Regarding claim 20, the drive signal includes an expansion element (16), ejection element (18) and a damping element (20) wherein the waveform controller defines the duration of the damping element (column 12, lines 20-53).

Regarding claim 21 and 22, the drive signal includes an ejection element (18), a damping element (20) and a connecting element (19) wherein the waveform controller defines the duration of the connecting element (column 12, lines 20-53).

Regarding claim 23, characteristics of the waveform elements are changed (column 13, line 52 - column 14, line 2).

Regarding claims 24, 25 and 28, the drive signal includes an expansion element (16) and ejection element (18) wherein the waveform controller defines the duration of the expansion and ejection elements and a duration (column 12, lines 20-53) and a potential difference (VHN) between an initial end and a termination end of the expansion element and ejection element (column 13, line 52 - column 14, line 2).

Regarding claims 26, 27 and 29, the drive signal includes an expansion element (16), holding element (17) and ejection element (18) wherein the duration of the elements is defined by the waveform controller (column 12, lines 20-53).

Regarding claim 33 and 36, the pressure generating element is a piezoelectric vibrator 40 (column 7, lines 49-58).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-7, 9, 13, 14, 16, 17, 31, 34, 35 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. US 6,116,717 in view of Nagoshi et al. US 6,224,182.

Anderson et al. discloses, regarding claim 1, a method of manufacturing an ink jet recording head including a plurality of nozzle orifices forming at least one row, pressure chambers (i.e. ink channels) communicating with the orifices and pressure generating elements (i.e. ink ejection heaters) provided to eject ink, the method comprising the steps of:

assembling the ink jet recording head (column 1, lines 16-25);

measuring a natural period of the ink pressure fluctuation in the pressure chamber of the assembled recording head (this corresponds to steps 170-182 as shown in figures 3 and 4 and described in column 4, line 54-column 5, line 34 in which the measurement of a natural period of ink fluctuation measured corresponds to the measurement of drop weights and velocities in accordance with flow feature and nozzle chamber variation of the print cartridges to achieve an optimal pulse width, it is noted by the examiner that although Anderson et al. uses slightly different terminology than applicant's claim language this step is performed in the same way as described by applicant with reference to page 28, lines 13-25 of applicant's specification); and

classifying the assembled recording head into one of a plurality of optimum pulse widths based on the measured natural period (this corresponds to step 184 as shown in figure 4 and described in column 5, lines 41-45).

Regarding claim 2, Anderson et al. discloses

supplying an evaluation signal (P2 as shown in figure 7) including an excitation element (t2) which excites the ink pressure fluctuation and an ejection element (t4) which follows the excitation element to eject the ink drop (column 5, line 59 - column 6, line 2);

measuring an ejected amount of the ink droplet at plural times while varying a time period between a termination end of the excitation element (t2) and an initial end of the ejection element (t4) (step 170, column 7, lines 2-11);

identifying the natural period based on a correlation between the time period and the measured amount of ink (column 7, lines 47-62).

Regarding claims 3 and 5, time interval (t4) is determined to have a nominal pulse width or a greater pulse width or lower pulse width dependent upon the ink ejection amount (column 6, lines 60-67).

Regarding claim 4, Anderson et al. discloses

supplying an evaluation signal (P2 as shown in figure 7) including an excitation element (t2) which excites the ink pressure fluctuation and an ejection element (t4) which follows the excitation element to eject the ink drop (column 5, line 59 - column 6, line 2);

measuring an ejection speed of the ink droplet at plural times while varying a time period between a termination end of the excitation element (t_2) and an initial end of the ejection element (t_4) (step 178, column 7, lines 19-33);

identifying the natural period based on a correlation between the time period and the measured ejection speed (column 7, lines 47-62).

Regarding claims 6 and 7, the excitation element (t_2) is cited to have a duration of 0.3 microseconds which is less than half of the nominal pulse width of 1.6 microseconds (column 6, lines 26-36).

Regarding claim 9, the optimum pulse width is indicated by a memory device on the recording head (column 5, lines 35-45).

Regarding claim 13, an electronic memory stores the optimum pulse width (column 5, lines 41-45).

Regarding claim 14, the drive signal is supplied to the pressure generating element for ejecting ink as shown in step 192 of figure 5.

Regarding claim 16, the drive signal is changed by offsets corresponding to the characteristics changing element (column 7, lines 51-62).

Regarding claims 17, 31 and 35, the ink jet recording head is illustrated in figure 2 as reference numeral (130), the TAB circuit (134) receives control signals for driving the recording head and memory (136) stores the optimum pulse width determined for the recording head to control the ejection waveform (column 3, lines 28-31).

Regarding claim 34 and 37, the pressure generating element is a heating element (column 1, lines 22-25).

Anderson et al. fails to disclose, regarding claims 1, 14 and 17, that the recording head is classified according to a plurality of ranks indicative of the optimum pulse width of the recording head.

Nagoshi et al. discloses classifying a recording head in accordance to ranks indicative of the optimum pulse width (see abstract) in order to properly identify and drive the recording head (column 4, lines 57-65).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to classify the recording head of Anderson et al. into a plurality of ranks as taught by Nagoshi et al.

The motivation for doing so would have been in order to properly identify and drive the recording head in accordance with the rank as taught by column 4, lines 57-65 of Nagoshi et al.

6. Claims 10-12 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. US 6,116,717 in view of Nagoshi et al. US 6,224,182, as applied to claims 9 and 17 above, and further in view of Ujita et al. US 5,506,611.

Anderson et al. teaches storing the pulse width data of the nozzle groups of the recording head in memory on the print cartridge (column 3, lines 28-31).

Nagoshi et al. teaches storing the rank of the recording head associated with the pulse width of the recording head in memory associated with the recording head (column 4, lines 57-65).

Anderson et al. in view of Nagoshi et al. fail to disclose that the ranks for the respective nozzle groups is stored as a symbol or coded information on the ink cartridge.

Ujita et al. discloses an inkjet cartridge (21) with a memory device (22) on the cartridge storing drive information for the cartridge (figure 10) and that providing a symbol of coded information (37) on the cartridge to be read with an optical reader (38) as shown in figure 13 is an equivalent to utilization of the memory device in storing information on the cartridge with the added advantage of providing the information storage more easily and inexpensively than using the memory device (column 17, lines 12-25).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to store the rank on the recording head as a coded symbol to be read by an optical scanner as taught by Ujita et al. instead of in a memory device as taught by Anderson et al. in view of Nagoshi et al.

The motivation for doing so would have been to provide the storage of the rank information more easily and inexpensively than using a memory device as taught by column 17, lines 12-25 of Ujita et al.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Blaise Mouttet whose telephone number is

Art Unit: 2853

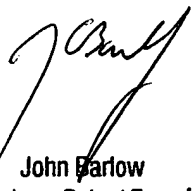
(703) 305-3007. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow, Jr. Art Unit 2853, can be reached on (703) 308-3126. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Blaise Mouttet July 24, 2002

Bm 7/24/2002


John Barlow
Supervisory Patent Examiner
Technology Center 2800